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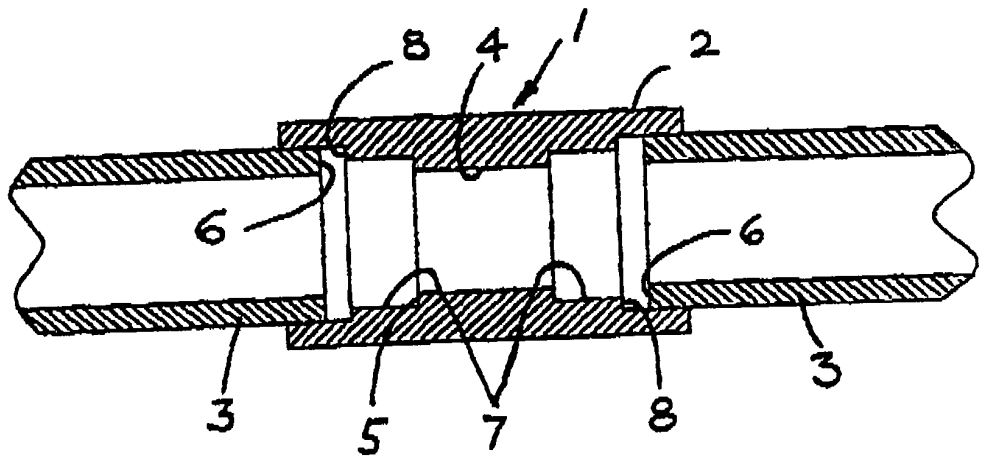

(57) Abstract

The invention relates to welded connections and in particular to so-called spin welding of pipes and/or pipe fittings to an interposed coupling member, and where the coupling member is spun at a high rate after the insertion of the ends of the pipes and/or pipe fittings to melt the plastics material at the interface and create a welded connection. Such techniques are adequate for relatively small diameters for pipes/fittings but not for larger diameters which can exhibit a greater degree of lack of circularity or a lack of homogeneity of molten material at the interface. The object of the present invention is to overcome this difficulty which objective is met by a construction of coupling sleeve-like member (1) of plastics material comprising at least one inwardly projecting circumferential rib (4) within its bore, and there being an abutment means (7) associated with the radial surfaces of the rib or ribs facing a respective end of the coupling sleeve-like member, to engage the end of a respective pipe or pipe fitting during the spinning of the coupling sleeve-like member.

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WELDED CONNECTIONS

This invention relates to welded connections and is particularly concerned with so-called spin welding where pipes and/or pipe fittings are secured together by a coupling member that is spun at a high rate to melt the plastics material at the interface and create a welded connection.

Such welding techniques have been found to be perfectly adequate with relatively small diameters of couplers and pipes/fittings, but the employment of this technique has not proved to be quite so successful on larger diameters, and the larger the diameter the less is the guarantee that an effective fully homogenous welded joint will be created. Albeit that spin-weld connections on larger diameter pipes have proved difficult in the sense of ensuring complete homogeneity, what is so is that the weld provides a considerable strength against the pipes being pulled out of the coupling.

The object of the present invention is to overcome the problem of lack of homogeneity.

According to the present invention, a coupling sleeve- like member of plastics material has at least one inwardly projecting, circumferential rib within the bore of the member, there being an abutment means associated with the radial surfaces of the rib or ribs facing a respective end of the coupling sleeve-like member, to engage the end of a respective pipe or pipe fitting during the spinning of the coupling sleeve-like member.

The abutment means may be a shoulder on the inner periphery of the coupling sleeve-like member extending to the adjacent radial face of the or the respective, rib. Alternatively, the abutment means may be projections formed on the radial surfaces of the rib or the outer radial faces of outer ribs when more than one rib is provided. Desirably, the radial width of the projection is less than the width of the radial face on which it is located, and further preferably, has a cross-section that reduces from the junction between the projection and the radial face to

the outer extremity of the projection.

According to a second aspect of the invention, a method of producing a spin weld connection between a coupling sleeve-like member as is defined above and adjacent ends of pipes and/or pipe fittings, comprises introducing the ends of pipes and/or fittings into opposite ends of the coupling sleeve-like member, causing the coupling sleeve-like member to rotate about the ends of the pipes and/or fittings, and forcing the ends of the pipes and/or fittings inwardly of the coupling sleeve-like member as it rotates to engage the abutment means during rotation.

By causing an inward movement of the ends of the pipes and/or pipe fittings during rotation of the coupling sleeve- like member, the abutment means associated with the rib or ribs internally of the coupling sleeve-like member are caused to bite into the end faces of the pipes and/or fittings as the abutment means and the end faces begin to melt, continued inward movement causing the whole of the abutment means to melt and form a homogeneous connection between the outer surface of the pipe end/fitting and the inner surface of the sleeve- like member, additional to the creation of an effective weld between the end faces of the pipes/pipe fittings and the respective radial faces of the rib or ribs in the bore of the coupling sleeve-like member. As a result, a joint is provided where the weld over the outer surface of the large diameter pipes provides considerable axial strength in the joint, and the homogeneity of the weld between the rib in the coupling sleeve-like member and the end faces of the pipes and/or fittings can be guaranteed. Consequently, fully homogenous, high strength joints, are assured.

The precise shape of abutment means in the form of a projection on the radial faces of the rib in the coupling sleeve-like member can be varied. It may, for example, be of triangular section, or may be rounded at its outer extremity. It may be pyrammidal or conical in shape, or more complex in shape, with concave surfaces.

In addition to substantially guaranteeing a homogenous weld, the invention has the added advantage of being able to accommodate pipe and/or pipe fitting ends that are not truly square, as a consequence of applying force to move the pipe ends inwardly of the coupling sleeve-like member during spin welding.

One embodiment of the invention will now be described with reference to the accompanying drawings in which :-

Figure 1 is a sectional side elevation of a sleeve-like member in accordance with the invention into which the ends of pipes/fittings have been inserted; and

Figure 2 corresponds to Figure 1 but shows a completed joint.

In the drawings a coupling sleeve-like member 1 has a socket 2 at each end to receive the end of a respective pipe end or fitting 3. Internally of the sleeve-like member 1 is a circumferential rib 4 having end faces 5 ultimately to be contacted by the end faces 6 of the respective pipe or fitting 3. Extending from each side of the circumferential rib 4 is a is an abutment 7, terminating in an end face 8.

To create an effective joint, the sleeve-like member 1 is rotated at a relatively high speed as the respective pipe ends/fittings 3 are inserted into a respective socket 2. Progressive insertion brings the end faces 6 of the pipe ends/fittings into contact with the end faces 8 on the abutments 7, continued insertion of the pipe ends/fittings and continued rotation causing the interface between the end faces 6 and 7 to melt, insertion of the pipe ends/fittings continuing until such time they abut the circumferential rib 4.

As a result, and as is particularly shown by Figure 2, the abutments 7 of each side of the circumferential rib 4 are effectively melted away to form a pool 9 of molten material between the outer surface of the pipe end/fitting 3 and the inner surface f the sleeve-like member 1 to create a homogeneous joint around the end f the pipe end/fitting, additional to the weld generated

between the end faces 5 of the internal rib 4 and the end faces 6 of the pipe ends/fittings. By virtue of the invention a substantial guarantee of an effective joint is provided for pipes/fittings of relatively large diameter with an ability to accommodate a noticeable deviation from true circularity of either the pipe ends/fittings or the sockets on the sleeve-like member.

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CLAIMS

1. A coupling sleeve-like member (1) of plastics material characterised in that there is provided at least one inwardly projecting circumferential rib (4) within the bore of the member (1), there being an abutment means (7) associated with the radial surfaces (5) of the rib or ribs (4) facing a respective end (2) of the member (1) adapted to engage the end (6) of a respective pipe or pipe fitting (3) during a spinning of the coupling sleeve-like member (1) and an insertion of the respective pipe or pipe fitting (3).

2. A coupling sleeve-like member as in Claim 1 characterised in that the abutment means (7) is a shoulder on the inner periphery of the coupling sleeve-like member (1) extending to the adjacent radial face (5) of the, or the respective, rib (4).

3. A coupling sleeve-like member as in Claim 1 characterised in that the abutment means are projections formed on the radial surfaces of the rib (4) or the radial surfaces of outer ribs when more than one rib is provided.

4. A coupling sleeve-like member as in Claim 3 characterised in that the radial width of the projection is less than the width of the radial face (5) on which it is located.

5. A coupling sleeve-like member as in Claim 3 or Claim 4 characterised in that the projection has a cross section that reduces away from the junction between the projection and the radial face (5) to the outer extremity of the projection.

6. A method of producing a spin weld connection between a coupling sleeve-like member (1) and adjacent ends (3) of pipes and or pipe fittings, characterised by introducing the ends (3) of the pipes and/or fittings into opposite ends (2) of the coupling sleeve-like member (1), causing the coupling sleeve-like member to rotate about the ends (3) of the pipes and/or fittings, and forcing the ends (3) of the pipes and/or fittings of the coupling sleeve-like member as it rotates to engage the abutment means (7) during rotation.

7. A method as in Claim 6 characterised in that the forcing of the ends (3) of the pipes and/or fittings is such as to cause the abutment means (7) to bite into the end faces (6) of the pipes and/or fittings (3) and generate a progressive melting of the abutment means whereby to form an effective weld between the end faces (6) of the pipes/pipe fittings (3) and the respective radial faces (5) of the rib or ribs (4) in addition to the weld formed between the inner surface of the coupling sleeve-like member (1) and the outer surfaces of the ends (3) of the pipes and/or fittings.

FIG. 1.

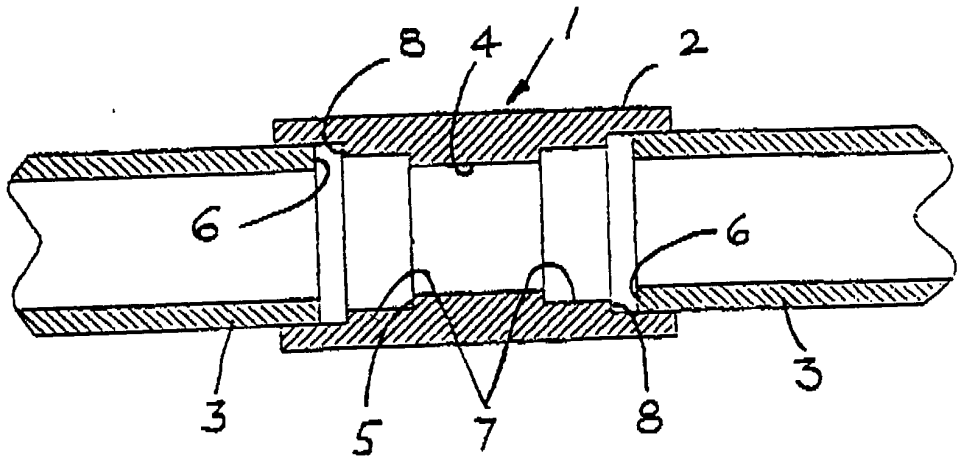
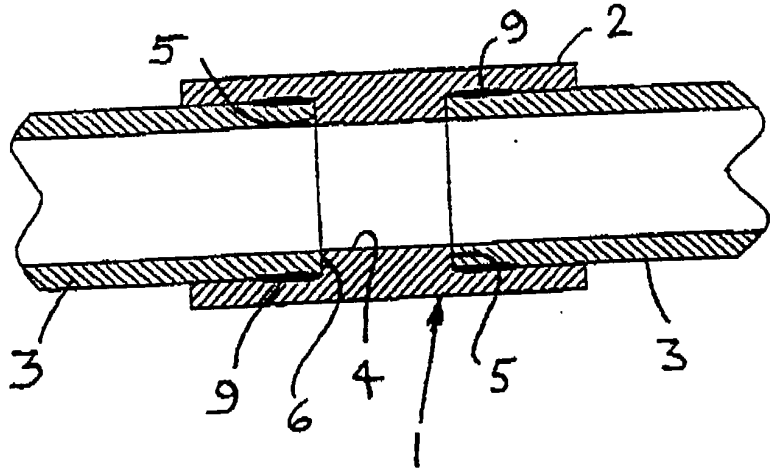


FIG. 2.



INTERNATIONAL SEARCH REPORT

Inter nal Application No
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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 94 24477 A (FUSION GROUP PLC ;BRIDGSTOCK ERIC (GB)) 27 October 1994 see page 2, line 23 - page 3, line 8; claims 1-8; figures 1-4 ---	1-6
X	DE 39 03 551 A (VOSS ARMATUREN) 24 August 1989 see column 2, line 33 - line 47; figure 1 ---	1-6
X	PATENT ABSTRACTS OF JAPAN vol. 012, no. 121 (M-686), 15 April 1988 & JP 62 248623 A (MOLTEN CORP), 29 October 1987, see abstract; figures ---	1-6
A	US 3 244 574 A (J.DECKER) 5 April 1966 see column 2, line 51 - line 54; figures 1,2 --- -/--	1-6

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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